The Phonology of *Wanna*-contraction Part 1: Generative phonological analyses revisited*

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1. Preliminary Remarks

This paper addresses two subject matters: (i) a critical review of previous generative phonological analyses concerning the phonological process of *wanna*-contraction; and (ii) an alternative analysis created on the basis of the best treatment among the previous analyses. The critical review first provides a brief summary of three representative analyses: Selkirk (1972), Suiko (1978), and Radford (1997). The brief summary is then followed by a critique in which shortcomings of each analysis are identified. An alternative analysis is then suggested on the basis of insights observed by Suiko (1978). A sequel to the present paper is in preparation. The sequel will make an inquiry into the *wanna*-contraction from a different angle putting the issue in perspective with reference to current developments in phonology such as optimality theoretic treatments.

By confining the scope of analysis to the phonological process of *wanna*-contraction, this paper suggests a solution to the following selective question: What phonological changes does the phrase *want to* undergo in order to become *wanna*? This scope limitation is intentional. The present paper and its sequel constitute a preparatory step to a larger work, the phonology of *wanna*-contraction, which in turn constitutes a part of my ongoing research tentatively entitled "The Integrated Analysis of *Wanna*-contraction: A lexically based algebraic approach". The work in progress not only attempts to integrate phonology, morphology, syntax, semantics, and pragmatics of *wanna*-contraction into a unified whole but it also endeavors to account for the *wanna*-contraction from a point of view of interaction among the components of grammar. I am undertaking the task

within the framework of lexically based algebraic theory of grammar initiated by Brame (1997), which is being developed by Brame and Kim (1999). A precursory work has already been rendered in Aniya (1998), which analyzes morphology-syntax interactions within the framework of Recursive Categorical Grammar (RCS), the direct parent of the lexically based algebraic approach.

With respect to the phonological process of *wanna*-contraction, there are only a few previous studies under the generative phonological approach. No direct analyses of *wanna*-contraction have been put forward within the framework of recent approaches such as lexical phonology and optimality theory. While not much contribution can be expected by ignoring contemporary developments in phonology, we can deepen our understanding of the phonology of *want to→wanna* phenomenon by digging deep into the subject. It is also true that any existing theory of grammar carries problems and limitations. Sooner or later any contemporary phonological theory has to come down to face small scale phenomena and deal with problems such as the one addressed above: What phonological changes contribute to the creation of *wanna* from *want to*? The present piece of work endeavors to answer the problem within the confined generative phonological framework. It succeeds in offering one possible yet pertinent answer with respect to the phonological process of *wanna*-contraction. Moreover, the answer is not only limited to the question but it also applies to relevant phenomena such as *want a → wanna* and *going to → gonna*. Furthermore, assenting arguments for the answer suggest some clues for characterizing "ease of articulation," a primary driving force of contraction phenomenon in connected speech.

There are at least two sources of *wanna*-contraction. In one case, the verb *want* and its infinitive complement *to* contract to form *wanna* [wãɾ̃ə][1], while in the other case the transitive verb *want* and the determiner *a* contract to form *wanna* [wãɾ̃ə] as illustrated in (1a) and (1b), respectively.
(1) a. I want to go home. /want#tu/→*wanna* [wãɾ̃ə]

    b. I want a beer. /want#ə/→*wanna* [wãɾ̃ə]
The explication of (1a) constitutes the primary task of this paper, whereas

(1b) offers a piece of evidence for a deletion-oriented analysis proposed and defended in subsection 2.3 and section 3 of this paper.

Specifically, an alternative analysis proposed and defended in this paper assumes a deletion-oriented derivation as shown under (2). (A more detailed derivation together with formalized rules will be given later in subsection 2.3 and section 3).

(2) Derivation of *wanna*

Underlying representation /want#tu/

Vowel Nasalization	wãnt tu
/t/ Deletion	wãntu
Vowel Reduction	wãntə
/t/ Deletion	wãnə
Nasal Tap	wãɾ̃ə

Phonetic representation   [wãɾ̃ə].

First, the prenasal vowel gets nasalized.   Second, the word-final /t/ of /want/ is deleted.   Third, the high back vowel of /tu/ undergoes vowel reduction and becomes a schwa.   Fourth, the postnasal /t/ gets deleted. Finally, the alveolar nasal stop /n/ transforms into a nasal tap [ɾ̃].

In section 3 we will see that the modified analysis eliminates all of the shortcomings of Suiko's (1978) deletion-oriented analysis.   The modified analysis strengthens Suiko's original insight reflected in his deletion rules by providing supporting arguments and corroboratory examples.   Further-more the alternative analysis accounts for relevant phenomena not discussed in Suiko (1978) by producing confirming arguments and concurring concrete examples in a cogent fashion.

2. Previous Analyses and Their Problems

2.1. Selkirk's (1972) tap-detap analysis

Selkirk's *wanna*-formation (1972:200) assumes a successive operation of tapping[2] and detapping of /t/. Consider the following simplified three-phased derivation (see Suiko (1978:311).

(3) Selkirk's *wanna*-formation

      want tu

         $\varnothing$ Cluster Simplification (see (4))

         ɾ   Tap Formation (see (5))

         $\varnothing$ Tap Deletion (see (6))

                      (Rules affecting vowel quality being disregarded)

      [wanə]

First, Cluster Simplification (4) eliminates the word-initial /t/ of /tu/ in order to reduce the double consonant tt cluster to a single t. Second, Tap Formation (5) transforms the word-final /t/ of /want/ into a tap [ɾ]. Finally, Tap Deletion (6) deletes the tap [ɾ].

(4) Cluster Simplification

$$
\begin{bmatrix} +\text{cons} \\ \alpha \text{ coronal} \\ \beta \text{ antrior} \\ \gamma \text{ contituant} \end{bmatrix} \rightarrow \varnothing \, / \begin{bmatrix} +\text{cons} \\ \alpha \text{ coronal} \\ \beta \text{ antrior} \\ \gamma \text{ contituant} \end{bmatrix} (\#) \underline{\hspace{1em}}
$$

(5) Tap Formation

$$
\text{t,d} \rightarrow \text{ɾ} / \, V \left(\left\{ \begin{matrix} 1 \\ n \end{matrix} \right\} \right) \underline{\hspace{1em}} (\#) \underset{[\text{-stress}]}{V}
$$

(6) Tap Deletion

$$
\text{ɾ} \rightarrow \varnothing \, / \, \text{n} \underline{\hspace{1em}} \underset{[\text{-stress}]}{V}
$$

     Suiko (1978) criticizes Selkirk's *wanna*-formation analysis in respect to four points.   First, no evidence seems to suggest the relevance of Cluster Simplification (4) in the derivation of *wanna*.   Second, the deletion of the word-initial /t/ of *to* rather than the word-final /t/ of *want* is unwarranted. Third, the tap [ɾ] without any vestige of /d/ is unacceptable[3], except in an extremely sloppy style of speech.   Fourth, although *want to, twenty,* and *interesting* are realized with the post-n/t/ as a tap or entirely lost, there is no

reason to assume that [wanə] has an intermediate form /wanɾə/ at an earlier point of derivation (see Suiko (1978:311)). The last point will be reexamined in the immediately following paragraph and section 3 of this paper.

Let us add a couple of more problems. First, the alleged intermediate form /wanɾə/ has no realization.[4] The double consonant cluster nɾ is considered unnatural for two reasons. The first reason is that the tap [ɾ] occurs exclusively in an intervocalic position. The second reason is that in the alleged sequence of nɾ the initial segment [n] blocks the articulation of [ɾ].[5] Notice that if we were forced to pronounce the cluster nɾə, the tongue blade would first make contact with the alveolar ridge because of the initial segment, alveolar nasal stop [n]. In an actual tapped articulation, however, the tongue blade in the initial stage makes no contact with the alveolar ridge. It follows from this that Tap Deletion (6) is superfluous therefore it should be dispensed with. Second, by assuming two unnatural and irrelevant rules, the Tap Formation and Tap Deletion, Selkirk's analysis runs counter to the "economy principle". Here the term economy principle is employed as a phonological counterpart of "least effort" criterion currently in use in syntactic analyses. The economy principle serves as the basis for the "ease of articulation" parameter in phonology. The tapping-detapping analysis is inconsonant with the economy principle: Why do we need the Tap Formation to create an unrealistic intermediate form, and then eliminate it by the Tap Deletion, which is superfluous in nature?

2.2. Radfor's (1997) geminate-degeminate analysis

Radford's (1997) offers only brief comments on *wanna*-contraction. Nevertheless, his idea of geminate-degeminate analysis is worth considering since it provides one possible way of analyzing the process of *wanna*-contraction. Radford (1997:269) assumes that "in colloquial English, the string *want to* can generally contract to *wanna* (through cliticization of *to* onto *want*, assimilation of /nt/ to /nn/, and degemination reducing /nn/ to /n/). Radford's (1997) does not show derivational fine points, therefore the present author provides, based on the above quoted passage, an

illustrative derivation under (7). In order to fill a gap in the derivation, a word-final /t/ deletion in terms of Word-final Post-n /t,d/ Deletion (see (9)) is also incorporated by the present author.

(7) Radford's derivation of *wanna* (simulated by the present author)

want to

Ø	Word-final Post-n /t,d/ Deletion
nn	Gemination
n	Degemination
	(Rules affecting vowel quality being disregarded)

[wanə]

The above analysis raises at least three problems. First, looking at the issue from the point of view of sequential constraint, geminate forms such as [wannə] are not allowed except in an emphatic use in child speech in contemporary English (see Ishibashi, et al. (1981:278;338)). Spellingwise, however, we find ample samples of geminate clusters in words such as *Ann, Anna, tanner, banner, canner,* etc. In such geminate clusters, the preceding vowel acquires the feature [+long] thereby being pronounced with prolonged duration. On the other hand, geminate clusters such as nn per se do not acquire the feature [+long]. Second, since the above points also apply to the case of *wanna*, Radford's assumption of the degemination reducing nn to n is invalid. Third, the geminate-degeminate analysis runs counter to the economy principle because it creates the artificial intermediate form containing the double consonant nn, which has to undergo degemination to thin out to a single consonant n. Therefore, the geminate-degeminate analysis is neither efficient derivationally nor natural in reality.

2.3. Suiko's (1978) deletion analysis

The purpose of this section is twofold: (i) to critically review Suiko's (1978) deletion-oriented analysis and pinpoint problems; and (ii) to suggest solutions to the problems. The solutions will be incorporated into a modified version of Suiko's analysis proposed in section 3.

Rejecting Selkirk's (1972) analysis as invalid, Suiko (1978:311) suggests

a deletion-oriented analysis as pictured in (8).

(8) Suiko's derivation of *wanna*

    want tu

      $\varnothing$ Word-final Post-n /t,d/ Deletion (see (9))

        $\varnothing$ Post-n /t/ Deletion (see (10))

    _____   (Rules affecting vowel quality being disregarded)

    [wanə]

(9) Word-final Post-n /t,d/ Deletion

$$t,d \rightarrow \varnothing / n\_\_ \#$$

(10) Post-n /t/ Deletion

$$t \rightarrow \varnothing / n(\#) \_\_ \underset{[\text{-stress}]}{V}$$

Notice that Word-final Post-n /t,d/ Deletion (9) removes the word-final /t/ from /want/, and then Post-n /t/ Deletion (10) eliminates the word-initial /t/ of /tu/. Suiko cites a large number of examples from Carterette and Jones (1974) as evidence for the two deletion rules. A set of representatives for each of the above two rules is shown in (11) and (12), respectively. (No changes have been made in the original phonetic transcriptions).

(11) Examples of the Post n /t/ Deletion

  a. At first we didn't like to take them but then we *wanted* to take...[wʌnəd].

  b. When I *wanted* to get a tooth out...[wanətə].

  c. Once I saw *Santa* Claus...[sænə].

  d. ...if you lead them into *fantasies*...[fænəsi:z].

(12) Examples of the Word-final Post -n /t,d/ Deletion

  a. I *haven't either* [hævəni:ðər].

  b. We *didn't ask you* [dɪdənæskju:].

  c. And I have an uncle who *went there* [wenðer].

  d. (That's what I) *want* [wan].

Suiko defends his deletion-oriented analysis on the basis of two grounds.

First, want alone may be realized as [wan] as shown in (12d). Second, Suiko's derivation in (8) is simpler than Selkirk's in (3).

I believe that Suiko's twofold defense is well-grounded and defensible. First, Suiko's derivation is indeed simpler because it commits itself to deletion exclusively, whereas Selkirk's derivation deals with three cases: deletion, tapping, and detapping. More strong arguments and acknowledging examples, however, should be provided for Suiko's two deletion rules. The Word-final Post-n /t,d/ Deletion proves its relevance on account of the above data cited from Carterette and Jones (1974). A little over two decades later, Radford, et al. (1999) acknowledge the word-final /t,d/ deletion to be a common phenomenon. Given below are some of his examples.

(13) Radford, et al's (1999:58) examples

    a. *best friend* → [bɛst frɛnd]-[bɛs frɛnd]

    b. *cold weather* → [koʊld wɛðə]-[koʊl wɛðə]

    c. *he stuffed the turkey* → [hiː stʌftðə tɛːkiː]-[hiː stʌfðə tɛːkiː]

    d. *she seemed funny* → [ʃiː siːmd fʌniː]-[ʃiː siːm fʌniː].

Additional support can be offered by a set of *to*-encliticization samples given below.

(14) *To*-encliticization examples

    a. *have to* /hæf#tu/ → *hafta* [hæftə]

    b. *used to* /yust#tu/ → *usta* [yustə]

    c. *supposed to* /səpozd#tu/ → *supposta* [səpostə].

Notice that in example (14a), the infinitive *to* [tu] becomes *ta* [tə], an allomorph of the infinitive *to* [tu]. It follows from this that the word-final /t/ of the host verb is deleted in the rest of the examples, while the word-initial /t/ of the infinitive to [tu] is retained in the form of the allomorph *ta* [tə].

A couple of more supporting arguments for Word-final Post-n /t,d/ Deletion (9) and Post-n /t/ Deletion (10) are indispensable in order to establish firmly their relevance and well-motivatedness. Our task now is to pinpoint the property of deletable segments and identify exactly what phonological property they bear. Recall that Word-final Post-n /t,d/

Deletion (9) eliminates word-final postnasal /d,t/, while Post-n /t/ Deletion (10) deletes postnasal /t/.   A careful observation of examples in (11), (12), (13), and (14) reveals that the former rule gets rid of unreleased alveolar stops, [d˺] and [t˺]; while the latter rule eliminates released [t].   Is this fact essential? Let us see.   Words like *hot time, white paper, good boy*, etc., contain a double consonant clusters, /tt/, /tp/, /db/, respectively.   The initial segment of the clusters is realized as the unreleased segment: [t˺t], [t˺p], [d˺b], respectively (see Bloomfield (1933:119); Ishibashi, et al (1981:278); Araki and Yasui (1992:1217)).   The same observation applies to the case of *want to* /want#tu/, the source of *wanna* [wãɾə].   The word-final /t/ of *want* becomes the unreleased [t˺] because of the presence of the right-adjacent word-initial /t/ of infinitive *to* /tu/ as illustrated in (15).

(15) want to [want˺tu]

In addition to the released vs. unreleased dichotomy discussed above, another important articulatory property comes into view.   Notice that the underlined two segments of *want to* [want˺tu] form a homorganic and coarticulatory cluster. We have now identified three environmental conditions.   First, the word-final segment of *want* [want] is an unreleased [t˺].   Second, the unreleased [t˺] is homorganic with the left-adjacent segment [n].   Third, the [t˺] is coarticulatory with the left-adjacent segment [n]. I believe that these three articulatory properties of the unreleased [t˺] pave the way for the [t˺] deletion to enhance ease of articulation in connected speech. Examples in (12) and (13) directly evince the deletion of [t˺].   Confirmatory examples for this assumption include these: *won't be* [wont→bi]→[wonbi], and *I must show you* [aj mʌst˺ ʃow yu] →[aj mʌs ʃow yu].   More examples can be provided to further support the above conclusion: *left turn* [lɛft˺ tərn]→[lɛf tərn]; *right turn* [rajt tərn]→ [raj tərn]; and *get together* [gɛt˺ təgɛðər]→ [gɛ təgɛðər].   We have proven that Word-final Post-n /t,d/ Deletion (9) is indeed relevant and well-motivated.

Now the question immediately comes into mind. What about Post-n /t/ deletion (10), is it also justifiable? Let us make an inquiry.   Now picture this on the mental screen: The removal of unreleased [t˺] from the form /want˺ tu/ creates the intermediate form /wantu/, which undergoes a vowel

reduction and becomes /wantə/. Notice that the intermediate form /wantə/ contains yet another homorganic and coarticulatory cluster nt. Notice further that the second segment of this cluster inevitably becomes a released [t] because of the following schwa. My assumption here is that the intermediate form /wantə/ undergoes the postnasal /t/ deletion and changes into the output form [wanə]. At this point what we have to show is that the deletion of the postnasal released [t], which is homorganic and coarticulatory, is indeed relevant and well-motivated. Notice that the case we have here is different from the one involving the unreleased [t'] discussed above. Therefore we have to search elsewhere for a solution. I assume that the deletion of [t] is attributable to the environment in which it gets deleted. Recall that the environment is specified in Post-n /t/ Deletion (10) as $n(\#)\underline{\quad} \underset{[\text{-stress}]}{V}$. We can detect a piece of evidence for the above

assumption in a set of examples given in (16). In the examples, the triple consonant cluster ntl first changes into ntəl by a rule of vowel epenthesis (see (17)), and then the postnasal released [t] gets deleted for ease of articulation. (We shall see in the following discussion that the alveolar nasal [n] further undergoes a change and becomes a nasal tap [r̃].)

(16) Examples of vowel epenthesis followed by [t] deletion

    a. gentlemen [dʒɛntlmən] → [dʒɛntəlmən] → [dʒnəlmən]

    b. accidental [æksədɛntl] → [æksədɛntəl] → [æksədɛnəl]

    c. instrumental [ɪnstrəmɛntl] → [ɪnstrəmɛntəl] → [ɪnstrəmɛnəl]

(17) Schwa Epenthesis (tentative)

$$\varnothing \to \mathschwa / \underset{[\text{+stress}]}{V} CC\underline{\quad}C$$

The examples in (16) reveal a significant point. In each example, a schwa is inserted to create a suitable environment for the released [t] deletion. Now we have come to the conclusion that the deletion of the released [t] in terms of Post-n /t/ deletion (10) is indeed motivated and justifiable. Moreover, hard evidence such as (11) confirm the deletion of released [t].

    It is now time to search out the weaknesses in Suiko's analysis. By

eliminating the weaknesses and modifying his treatments if necessary, we can bring about a greater understanding of *wanna*-contraction. Although Suiko's analysis is superior to the competing analyses discussed above, it raises a couple of problems. First, the two deletion rules should be collapsed into one rule to achieve simplicity in rule formalization. (By accomplishing this we obtain a favorable result as we shall see soon.) Second, by assuming the output form [wanə] Suiko fails to account for the change of the alveolar nasal stop /n/ into a nasal tap [ɾ̃]. In order to achieve descriptive accuracy this phenomenon should be accounted for. Let us now begin with the first problem and seek a solution. The two rules, Word-final Post-n /t,d/ Deletion (9) and Post-n /t/ Deletion (10) can be collapsed into a single rule. Post-n /t,d/ Deletion (18) now supersedes the previous two rules (9) and (10). Another advantage of the collapsed rule is that it can account for the deletion of postnasal /d/ as shown in the following examples: *kindergarten* [kɪndərgartn̩] → [[kɪnərgartn̩]; *spender* [spɛndər] → [spɛnər]; *tender* [tɛndər] → [tɛnər]; *winder* [wajndər] → [wajnər]; etc. Notice that Post-n /t/ Deletion (10) as it stands is ineffective in accounting for such examples.

(18) Post-n /t,d/ Deletion (optional)

$$\begin{Bmatrix} t \\ d \end{Bmatrix} \rightarrow \varnothing\ /\ n(\#)\_\_\begin{Bmatrix} V \\ \text{[-stress]} \\ \# \end{Bmatrix}$$

The second problem has to do with the output form [wanə] in the derivation shown under (8). Based on my empirical observation and arguments developed below, I assume that the form [wanə] undergoes yet one more change of nasal tap and becomes [waɾ̃ə]. (Actually it should be transcribed as [wãɾ̃ə] if we take vowel nasalization into consideration.) The form [wanə] is distinct from [wãɾ̃ə]. The former contains [n], while the latter includes [ɾ̃]. Conspicuously the [ɾ̃] involves "tapped" articulation, but the [n] is devoid of it. Two observations affirm the above assumption. First, native speakers of American English that I interviewed attested that the pronunciation of *wanna* involves a tapped articulation analogous to that of /t,d/ tap. Pullum (1997) observes that *wanna* is phonologically tran-

scribed as [wãɾə].   This is a penetrating observation since it acknowledges not only the tap but also the nasal quality of the left-adjacent vowel.[6]   In order to see the significance of the observations, let us now examine the source of tap.   We begin with a known fact.   There are two sources of tap [ɾ]: /t/ and /d/.   Given below are examples taken from Araki and Yasui (1992:522).

(19) /t,d/ tap examples

   a. /t/→[ɾ]: writer, water, petal, latter, battle, etc.

   b. /d/→[ɾ]: rider, ladder, etc.

As the above examples evince, either /t/ and /d/ changes into tap [ɾ] if it occurs intervocalically and its left-adjacent vowel is stressed.   Now comes the question: What is the nasal counterpart of [ɾ], which fills the gap on the right side of the arrow-head in (20)?

(20) /n/→[?]: banner, canner, thinner, tanner, etc.

Araki and Yasui (1992:522) assume that the answer is a nonnasalized [ɾ]. This assumption is false.   The correct answer is a nasalized [ɾ̃].   The [ɾ̃] is indeed distinct from [ɾ].   The former preserves nasality, while the latter is devoid of it.   Unlike the examples in (19) the examples in (20) retain the nasal quality in tapped articulation.   Based on the above observations, I take a step forward and claim that *wanna* is phonetically transcribed as [wãɾ̃ə], which should be derived from the intermediate form /wanə/ in terms of a rule of nasal tap.   The rule can be formalized as in (21).

(21) Nasal Tap (optional)

$$n \rightarrow \tilde{r} / \underset{[+stress]}{V} \_\_ V$$

Notice that the environment in which the change occurs is exactly the same as that in the case of /t,d/ tap phenomenon.   Notice also that the segment /n/, which undergoes the change shares common features with /t/ and /d/ since the three sounds compose a natural class.   It is quite natural to assume that the [ɾ̃] retains the feature [+nasal] as a vestige of its source, the alveolar nasal stop.

3 Alternative Analysis and Its Defense

3.1. Alternative analysis

The alternative analysis I propose here is a modified, extended version of Suiko's (1978) analysis. The alternative analysis eliminates three shortcomings of Suiko's deletion analysis: (i) a failure of collapsing the two relevant rules into a single rule; (ii) a neglect of including /d/ into the set of candidates for the postnasal deletion; and (iii) a disregard of incorporating a nasal tap rule. The three shortcomings are eliminated in terms of two rules (18) and (21). One more device is necessary in order to account for the phonological process of *wanna*-contraction. The device is a rule of vowel reduction, which changes the high back vowel /u/ into a schwa in the present case. A rule formalized based on Chomsky and Halle (1968:110-26) is given under (22).

(22) Vowel Reduction

$$\begin{bmatrix} V \\ -\text{tense} \\ -\text{stress} \end{bmatrix} \rightarrow \vartheta / \, C\_\_ \ (C)$$

By acknowledging the relevance of rules (18), (21), and (22) we now move forward to show a detailed derivation of *wanna*.

In essence the word *wanna* [wãɾə] was created once and for all from *want to* /want#tu/ in terms of three rules: Post-n /t,d/ Deletion (18), Nasal Tap (21), and Vowel Reduction (22). Consider now the following derivation of *wanna* [wãɾə]. (I disregard the formalization of the first three rules, Stress Assignment, Vowel Nasalization, and Unreleased /t/ in order to keep the discussion compact.)

(23) Detailed derivation of wanna

Underlying Representation	/want tu/
Stress Assignment	wánt tu
Vowel Nasalization	wãnt tu
Unreleased /t/	wãnt⁷ tu
Post-n /t,d/ Deletion	wãntu
Vowel Reduction	wãntə

Post-n /t,d/ Deletion	wãnə
Nasal Tap	wãɾ̃ə
Phonetic Representation	[wãɾ̃ə]

Our primary task is now coming to completion. At this point let us consider for heuristic purposes one more possible analysis, which I thought a promising candidate but I abandoned it later for a number of reasons. By making an inquiry concerning the possible analysis we can see deeper into the *wanna*-contraction phenomenon and understand the subject more clearly than before.

3. 2. A counter-proposal: coalescence-oriented analysis

A coalescence-oriented analysis we are about to see resorts to two rules, Word-final post-n /t,d/ Deletion (9) and Nasal Tap Coalescence (see (24)). The latter rule changes any element in the set of homorganic and coarticulatory consonant clusters of {nt, nd, ŋt, ŋd} into a nasal tap [ɾ̃], if the relevant segment occurs intervocalically and the left-adjacent vowel bears a stress.

(24) Nasal Tap Coalescence (optional)

$$\begin{bmatrix} C \\ \text{+nasal} \\ \text{-labial} \end{bmatrix} \begin{Bmatrix} t \\ d \end{Bmatrix} \rightarrow \tilde{r} / \underset{[\text{+stress}]}{V} \_\_ V$$

Assuming the above two rules as relevant, the coalescence-oriented analysis proposes the following derivation of *wanna*.

(25) Coalescence-based derivation of *wanna*

Underlying Representation	/want#tu/
Stress Assignment	wánt tu
Vowel Nasalization	wãnt tu
Unreleased t	wãnt¹ tu
Word-final Post n /t/-Deletion	wãntu
Vowel Reduction	wãntə
Nasal Tap Coalescence	wãɾ̃ə
Phonetic Representation	[wãɾ̃ə]

Notice that the coalescence-oriented derivation is a little simpler than the

alternative deletion-oriented derivation given in (23) since the former employs less number of rules. Nasal Tap Coalescence (24) appears tempting since it seems to account for a classic example of *to*-encliticization: *going to* /goɪŋ#tu/ → *gonna* [gʌɾ̃ə]. (Disregard the changes affecting vowels for heuristic purposes.) Nasal Tap Coalescence (24) changes ŋt into ɾ̃ at just one sweep. This point is significant. We cannot ignore the fact that *wanna* [wãɾ̃ə] and *gonna* [gʌɾ̃ə] bear a close parallel in showing the phonological alternation between *ta* [tə] and na [ɾ̃ə] in *to*-encliticization.

Our task now is to take up the challenge and show that the coalescence-oriented analysis is false, and at the same time we have to prove the validity of the alternative deletion-oriented analysis. Let us first examine the *gonna* problem. Compare the following two oversimplified derivation. (Disregard the changes affecting vowels, and concentrate on the two contiguous consonants ŋt.)

(26) Coalescence vs. deletion in *gonna* [gʌɾ̃ə] derivation

   a. Coalescence-oriented derivation

     going to /goɪŋ tu/ → /goŋtə/ → *gonna* [gʌɾ̃ə]

   b. Deletion-oriented derivation

     going to /goɪŋ tu/ → /goŋtə/ → /gontə/ → /gʌnə/ → *gonna* [gʌɾ̃ə]

In (26a) we see that the two adjacent segments, ŋt changes into the nasal tap [ɾ̃]. Now try pronouncing the double consonant cluster ŋt and feel the articulators. You see that the cluster ŋt here is actually a homorganic and coarticulatory cluster nt. I assume that the following changes are at work. In articulating [ŋt] the back of the tongue does not make contact with the velum because of the anticipatory articulation involving the right-adjacent [t]. The tongue blade rather makes contact with the alveolar ridge just like it does when making [n] sound. As a result we obtain the homorganic and coarticulatory cluster nt, whose last segment is a released [t]. Does this cluster look familiar? It is exactly the same as that we have seen in the derivation of *wanna* presented in (25). Therefore the alleged coalescence analysis is considered false.

Three more arguments against the coalescence-oriented analysis can be produced. First, the first segment of the double consonant cluster ŋt

assimilates to the following t in the place of articulation and becomes n in connected speech. This can be detected in the following pair of examples: *goingta* [goɪŋtə]-*gointa* [goɪntə]. Therefore, the one sweep change advocated by the coalescence-oriented analysis is inappropriate. Second, if the coalescence-oriented analysis were assumed as valid, then we would have to admit three sources of nasal tap: (i) clusters nt and nd as in words such as *center* and *sender*, respectively; (ii) clusters ŋt and ŋd as in words like *going to* and *ding dong*, respectively; and (iii) a single n in words such as *banner* and *canner*. This is an undesirable situation in the eye of simplicity. All of the three sources can be reduced to just one under the alternative deletion-oriented analysis. Finally, the alleged nasal tap coalescence is extremely limited in applicability. We do not find analogous examples of coalescence involving a cluster consisting of two stops as advocated by the alleged coalescence-oriented analysis. We can, however, easily find examples of coalescence involving a cluster consisting of a stop and a continuant consonant as shown in (27).

(27) Examples of coalescence

    a. *would you* [wʊdʲu] → [wʊdʒu]

    b. *could you* [kʊdʲu] → [kʊdʒu]

    b. *meet you* [mitʲu] → [mitʃu]

    c. *hit you* [hɪtʲu] → [hɪtʃu]

Based on the above line of reasoning we dismiss the coalescence-oriented analysis.

    Let us make one final remark before we go on to the next issue. In considering the derivation of *gonna*, it is also wrong to assume a nasal deletion followed by tap formation as shown in the following oversimplified derivation: *going to* /goɪŋ#tu/ → goŋtə → gotə → *gonna* [gʌɾ̃ə]. This assumption is indeed untenable since if the velar nasal gets deleted first, then we cannot account for the nasal quality of [ɾ̃] in *gonna* [gʌɾ̃ə]. On the other hand, if we assume that the /t/ → [ɾ] tap takes place prior to the velar nasal deletion, then we would have the unnatural, inadmissible form /goŋɾə/.

3.3. Residual problems

A residual problem presses for a solution. The word *wanna* [wãɾ̃ə]
also occurs in examples such as *I want a beer.* How did this come about,
and what is the derivational difference(s) between this case and the case of
want to→ wanna [wãɾ̃ə]? There are two possible derivations for *want a →*
wanna [wãɾ̃ə] phenomenon. One involves coalescence (see 28), whereas
the other involves deletion (see 29)). (Some relevant rules are
disregarded here to keep the discussion concise.)

(28) Derivation I

Underlying Representation	/want#ə/
Released /t/	wãntə
Nasal Tap Coalescence	wãɾ̃ə
Phonetic Representation	[wãɾ̃ə]

(29) Derivation II

Underlying Representation	/want#ə/
Released /t/	wãntə
Post-n /t,d/ Deletion	wãnə
Nasal Tap	wãɾ̃ə
Phonetic Representation	[wãɾ̃ə]

In Derivation I, the homorganic and coarticulatory sequence of nt in the
environment   V ___ V becomes [ɾ̃] by Nasal Tap Coalescence (24). We
            [+stress]

have seen in subsection 3.2 that Nasal Tap Coalescence (24) is implausible
for a number of reasons. One of the defects applies to the nt →ɾ̃
coalescence in question has to do with generality. The alleged coalescence
involving double stop consonants is an isolated case in connected speech.
There are, however, plenty of cases which support the coalescence where a
cluster consisting of a stop and a continuant consonant changes into an
affricate. This is substantiated by the examples in (27). In Derivation II,
on the other hand, the word-final /t/ is eliminated by Post-n /t,d/ Deletion
(18). This deletion operation is motivated. The word-final /t/ here has
several properties prone to deletion. Not only is it homorganic and
coarticulatory with the left-adjacent /n/ but it is also a released [t] followed

by a schwa.   This is exactly the same environment as in the case of *want to*
→ *wanna* change as we have seen above.   The arguments for the deletion-
oriented analysis and corroborative examples provided in subsection 2.3
also apply here.   Therefore the word-final /t/ under consideration is
considered a primary target of deletion for ease of articulation.   It follows
from the above discussion that the alternative deletion-oriented analysis
supersedes the coalescence-oriented analysis.

4. Concluding Remarks

With respect to the phonological process of *wanna*-contraction, three
previous analyses have been examined.   Selkirk's (1972) tap-detap analysis
and Radford's (1996) geminate-degeminate analysis are rejected on the
basis of economy principle and analysis-internal weaknesses such as the
invalid post-n /t/-tapping, and the implausible gemination of nn from nt,
respectively.   Unlike the two previous analyses, Suiko (1978) has offered a
simple deletion-oriented analysis. Although undermined by some weak-
nesses such as a technical problem of rule formalization, failure to
recognize a relevant segment which undergoes deletion, and insufficient
derivational details; Suiko's (1978) insight reflected in his two deletion rules
is by no means relevant and crucial in analyzing the process of *wanna*-
contraction.   Acknowledging this point, I have advanced an alternative
analysis within the framework of generative phonological approach.   It is
shown that the alternative analysis eliminates all of the shortcomings of
Suiko's analysis.   Moreover, the alternative analysis provides supporting
arguments and confirming evidence for a modified and extended deletion-
oriented analysis from a wider perspective than Suiko (1978) envisaged in
his analysis.   Furthermore in the course of the present discussion several
environmental factors for the Post-n /t/ Deletion have been made explicit.
The environmental factors help identify possible clues for determining the
driving forces of ease of articulation in both the word-level and the phrase-
level phonology.

Notes

*   Special thanks to Peter M. Skaer, my colleague for his careful reading and suggestions which led to many improvements and clarity of the materials discussed in this paper.

1. For the sake of phonetic precision, I make distinction, following Ladefoged (1975), between tap and flap. "A tap is caused by a single contraction of the muscles so that one articulator is thrown against another. It is simply a very rapid articulation of a stop closure. Taps occur in many forms of American English as the regular pronunciation of /t,d,n/ in words such as "latter, ladder, tanner."... A flap is an articulation in which one articulator strikes another in passing while on its way back to its rest position. In some forms of American English /t,d,n/ are flaps when they occur after /r/ in words such as "dirty, birdie, Ernie" (see Ladefoged (1975:147)). Accordingly, the IPA symbol [ɾ] is employed instead of the US [D] to represent tap throughout this paper. Supporting arguments and corroborative examples for the nasal tap [ɾ̃] will be given in subsection 2.3.

2. Based on the distinction between tap and flap made in note 1, the term flap is replaced with tap in the analyses of Selkirk (1972), Suiko (1978), and the relevant previous analyses discussed in this paper.

3. This observation is false. The tap [ɾ] indeed retains some vestiges of /d/. They share common features such as [+voiced, +alveolar, +coronal].

4. The closest example of /wanɾə/ would be *wonder* [wandər]. The post-n [d] in this example, however, does not change into [ɾ]. The post-n [d] rather gets deleted. And then the left-adjacent [n] transforms into [ɾ̃]. See subsection 2.3 and section 3 for details.

5. See note 1.

6. Pullum's observation raises a tempting question: Where does the nasal quality of [ã] come from? The nasalization is attributable to the vowel nasalization, a common phenomenon observed in English. The vowel in question gets nasalized under the influence of the right-adjacent alveolar nasal [n]: *want tu* [want#tu] → [wãnt#tu]. Under the deletion-oriented analysis advocated in this paper, the input form /wãnt#tu/ undergoes a series of changes and becomes the output form [wãɾ̃ə] as shown in the following oversimplified derivation: *want to* /want#tu/ → wãntu → wãntə → wãnə → wãɾ̃ə → *wanna* [wãɾ̃ə]. See section 3 for details.

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